

Current Beryllium Health and Safety Research Activities

<i>Title</i>	<i>Sponsor</i>	<i>LDRD</i>	<i>Research Org</i>	<i>Status</i>	<i>\$M Thru '03</i>
Exposure					
<i>Total for Exposure</i>					3.24

Improve sampling methods

Fine particulates sampling

Develop sampling methods that characterize fine and ultra-fine beryllium particulate exposure.

An Automated System for Task-Based Evaluation of Size Distributions of Beryllium Aerosol at the Los Alamos Beryllium Technology Facility	UC UCDRD	Y	UCLA	Inactive	0.14
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Develop sampling methods that characterize beryllium particulate exposure by mass, number, size fraction, chemical form, particle surface area.

NIOSH Beryllium Control Technology (Aerosol Number and Surface Area) Exposure Assessment Studies	NIOSH	N	NIOSH/Division of Applied Research and Technology (DART)	Active	0.25
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Real-time monitoring

Develop promising near real-time monitoring instruments or sampling and analytical methods.

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Evaluation of Prototype Near Real-Time Beryllium Monitor - Laser Induced Breakdown Spectrometer (LIBS)	BWXT Pantex Technology Development & Deployment	Y	BWXT Pantex Technology Development & Deployment Department and Industrial Hygiene Department	Active	0.51
BeAlert Near Real Time Beryllium Analyzer	DOE & NIEHS	N	ELS Technology, Inc.	Inactive	0.82
Beryllium Smear Wet Chemical Method Using Aqueous Beryllium Standard Solutions	Defense Programs and Safety & Health	Y	Savannah River Technology Center	Active	0.05
Real Time Beryllium-in-Air Monitor	Oak Ridge Y-12	N	Oak Ridge Y-12	Active	0.39
Measurement of Beryllium Oxide In Air by Surfaced Enhanced Raman Spectroscopy	Oak Ridge Y-12	Y	Oak Ridge Y-12	Active	0.38
Real Time Identification of Airborne Particles By Time-of-Flight Mass Spectrometry	Oak Ridge Y-12	Y	Oak Ridge Y-12	Active	0.50
Identification of Ultrafine Particles By Time-of-Flight Mass Spectrometry	Oak Ridge Y-12	Y	Oak Ridge Y-12	Active	0.05
Automated Beryllium Analysis	LANL ADAPT Campaign	N	LANL	Active	0.12

Skin exposure

Develop a method for quantifying skin and mucous membrane exposure.

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NIOSH Beryllium Dermal Exposure Characterization Studies	NIOSH	N	NIOSH/Division of Surveillance, Hazard Evaluations and Field Studies (DSHEFS), DRDS, and HELD	Active	0.03

Needed tools.-Exposure

Nanogram analysis

Develop and validate analytic methods sensitive to the 0.1 nanogram per sample level of quantitation.

Femtogram Detection of Beryllium in Biological Samples by Accelerator Mass Spectrometry: Applications for Studying Chronic Beryllium Disease	DOE, Office of Biological and Environmental, Life Sciences Division,	N	Lawrence Livermore National Laboratory	Active
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Controls

Total for Controls 0.04

Develop improved controls.

DOE-wide controls

Develop improved engineering and administrative controls having DOE-wide application for beryllium operations, maintenance and construction activities.

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NIOSH Fine Beryllium Particle Control Technology Documentation and Evaluation Studies	NIOSH	N	NIOSH/Division of Applied Research and Technology (DART)	Active	0.04

Health Effects

Total for Health Effects 9.07

Disease process.

Pharmacokinetic model.

Characterize and determine the health significance of the physiochemical properties of beryllium. Determine the bioavailability of beryllium at different locations in the body; the health impacts at those locations and the impact on remote organ systems.

Role of Surface Area, Size, and Beryllium Mass Content in Beryllium Dissolution from Respirable Size Beryllium Metal, Beryllium Oxide, and Copper-Beryllium Alloy Particles Associated with Prevalence of Chronic Beryllium Disease	NIOSH Research Grant 1R03 OH007447-01	N	LANL Health, Safety, and Radiation Protection Group (HSR-5)	Active	1.00
Beryllium Chemistry in the Body	LANL-Lab Directed Research	Y	LANL	Active	2.10
NIOSH Studies on the Immunopathology of Beryllium Disease, Including Skin Exposure, Using a Mouse Model	NIOSH	N	NIOSH/Health Effects Laboratory Division (HELD)	Inactive	

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Cytotoxicity and Solubility of Beryllium Particles	NIOSH Grant 5R03OH007447 -02	N	Johns Hopkins University	Active	0.08
NIOSH Beryllium Exposure Assessment Considering Particulate Characteristics Studies	NIOSH	N	NIOSH/Division of Respiratory Disease Studies (DRDS)	Active	0.02
Beryllium Transport Into Cells		N	Los Alamos National Laboratory, Chemistry Division, Actinide, Catalysis and Separations Group		

Natural history of disease.

Determine the natural history of beryllium disease: sensitization to disease; different rates of progression; workers and public; include non-occupational exposures; risk factors e.g., genetics, underlying disease, gender, age, smoking.

NIOSH Beryllium Molecular Dynamics Simulations	NIOSH	N	NIOSH/Health Effects Laboratory Division (HELD)	Active	0.02
NIH Study: Pathogenic T Cells Role in Chronic Beryllium Disease	National Institutes of Health	N	University of Colorado Health Sciences Center		
NIOSH Study to Identify Specific Genes that are Factors in Beryllium Disease	NIOSH	N	NIOSH/Health Effects Laboratory Division (HELD)	Active	0.16

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NIOSH Beryllium Epidemiology Studies	NIOSH	N	NIOSH/Division of Respiratory Disease Studies	Active	0.24
Local Angiotensin System in Lung Fibrogenesis in Response to Chronic Beryllium Disease	National Heart Lung and Blood Institute (NHLBI)	N	National Jewish Medical and Research Center	Complete	0.70
NIH Study: Cytokine Regulation of Environmental Beryllium Lung Disease	National Institute for Environmental Health Sciences (NIEHS)	0	National Jewish Medical and Research Center		
Structural and Functional Basis of Genetic Susceptibility to Chronic Beryllium Disease	DOE Office of Science, Office of Biological and Environmental Research	N	University of Rome, Italy	Inactive	
NIH Study: Pathogenic T Cells in Chronic Beryllium Disease	National Heart Lung and Blood Institute (NHLBI)	N	National Jewish Medical and Research Center		
Immunogenetic and Exposure Risk Factors in Beryllium Disease	National Institute for Environmental Health Sciences	Y	National Jewish Medical and Research Center	Active	0.70

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Role of Beryllium-specific T Cells in Beryllium Sensitization and Disease	National Institute for Environmental Health Sciences	N	University of Colorado Health Sciences Center		
Cytokine Gene Regulation in Beryllium Disease	National Institute for Environmental Health Sciences	N	National Jewish Medical and Research Center	Active	0.87

Dose-response.

Determine the dose-response relationship for beryllium sensitization and disease for different exposure parameters, i.e., mass, number, size fraction, chemical form, particle surface area.

NIOSH Extramural Exposure-Response Studies	NIOSH	N	NIOSH/Division of Respiratory Disease Studies (DRDS)	Complete	
Chronic Beryllium Disease Among Beryllium-Exposed Workers	NIOSH and DOE	N	Michigan State University	Active	0.85
NIOSH Beryllium Lung Cancer Case-Control Studies	NIOSH	N	NIOSH/Division of Surveillance, Hazard Evaluations and Field Studies (DSHEFS)	Complete	
Beryllium Sensitization, Chronic Beryllium Disease, and Exposures at a Beryllium Mining and Extraction Facility	Brush Wellman, Inc.	N	Brush Wellman, Inc.	Complete	

Diagnosis.

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Disease in general public.

Determine the prevalence of sensitization and disease in the public. Include support personnel around beryllium operations. Consider smoking. Include natural and other non-occupational exposures.

NIOSH Estimates of the Number of U.S. Beryllium Workers	NIOSH	N	NIOSH/Division of Respiratory Disease Studies (DRDS)	Inactive	
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Interventions and treatments

Identify opportunities for therapeutic interventions (pre-CBD) or specific therapies for CBD.

Novel Major Histocompatibility Complex (MHC) Class II Constructs for Treatment of CBD	NIEHS	N	Oregon Health & Science University	Complete	2.00
Modern Chemistry Techniques in the Development of Beryllium-Specific Chelators for Medical and Environmental Use	LLNL (LDRD Internal Funding)	Y	Lawrence Livermore National Laboratory	Inactive	0.33

Needed tools.-Health Effects

Animal model and cell line

Develop an animal that models human CBD by contracting the disease after exposure to beryllium.

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Mouse Technology Development for Functionalizing JGI Sequence--Mouse Model of CBD Susceptibility	DOE Office of Science, Office of Biological and Environmental Research	N	Lawrence Berkeley National Laboratory		
<i>Total for All</i>					12.35